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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,237	12/10/2003	Hiroaki Ono	246391US6	4868
22850 7590 09/20/2007 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER HUNG, YUBIN	
			ART UNIT 2624	PAPER NUMBER
			NOTIFICATION DATE 09/20/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/731,237

Applicant(s)

ONO ET AL.

Examiner

Yubin Hung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 8-12 and 14 is/are rejected.
- 7) ☒ Claim(s) 4, 6 and 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment/Arguments

1. This action is in response to amendment filed 08/21/07, which has been entered.
2. Claims 13 has been cancelled and claim 14 added; currently claims 1-12 and 14 are still pending.
3. In view of Applicant's amendment, the 35 USC § 101 rejections of claims 12 and 13 have been withdrawn.
4. In view of Applicant's amendment, the 35 USC § 112 rejections have been withdrawn.
5. In view of Applicant's amendment, the 35 USC § 103 rejections of claims 71-73 (cancelled) have been withdrawn.
6. Applicant's arguments filed 08/21/07 have been fully considered but they are not persuasive; see below.
7. **In remarks Applicant argued in substance:**

- 7.1 *that Kakarala does not teach the edge detection means and the first interpolation means recited in claim 1 because u_2 , the direction of least change, is used as the direction of interpolation while the cited edge detection portion of Kakarala (P. 12)*

However, the cited edge detection portion of Kakarala recites the computation of gradient, which is widely used in the art to detect edge points and reflects both the edge strength and the direction (the edge direction, u_2 , is perpendicular to the direction of largest change, as is well known in the art), as has been disclosed in Kakarala and applicant clearly is aware of (see footnote 5 on page 12).

Therefore the argument is not persuasive.

- 7.2 *that Kakarala does not teach the second interpolation means recited in claim 1 because the same adaptive smoothing used on green pixels is used on red and blue pixels as well (P. 13, 1st paragraph)*

However, this is an incorrect reading of Kakarala since per Fig. 2, refs. 46a & 46b and Col. 6, line 32 of Kakarala a bilinear difference interpolation logic, which is not the same as the adaptive interpolation logic for green, is used for red and blue. Therefore the argument is not persuasive.

- 7.3 *that Kakarala does not teach interpolating red and blue on the basis of the first color component (P. 13, 2nd paragraph)*

However, this is an incorrect reading of Kakarala since per Fig. 2, refs. 28a, 28b (both showing the first component being used for subsequent interpolation) and 46a & 46b, the first component, is used for the interpolation of red and blue pixels. Therefore the argument is not persuasive.

7.4 *that Lin neither teaches making the sensitivity characteristics of pixels in the predetermined area uniform relative to optical intensity nor teaches generating local area information including pixels (P. 13, last paragraph)*

However, as applicant admits in the same paragraph, Li discloses calibrating an imaging array such that the captured bias is applied for subsequent image capture; this process therefore makes the sensitivity characteristics of pixels in the predetermined area uniform relative to optical intensity. Once the bias is applied (including to the pixels in the extracted local area), local area information including pixels, each with uniform sensitivity characteristic relative to the optical intensity is generated. (Note that the extraction of local area is taught by Kakarala and Lin teaches making all pixels having uniform sensitivity characteristic.) Therefore the argument is not persuasive.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 2 11-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakarala et al. (US 7,088,392), and further in view of Lin et al. (US 6,069,973).
10. Regarding claim 1, and similarly claim 14, Kakarala discloses an image processing apparatus [Fig. 1] that generates a plurality of color components [Fig. 1, ref. 35] on the basis of a color-and-sensitivity mosaic image [Fig. 1, ref. 25], comprising
- extraction means for extracting a predetermined area centered on a pixel of interest, which is an object to be processed, from the color-and-sensitivity mosaic image [Refs. 40 (extraction means) of Fig. 1 and Fig. 2; Fig. 2, ref. 42; Col. 5, lines 1-10; Col. 8, lines 53-65. Note that the predetermined area is 3x3. Note further that all functions corresponding to the limitations of this claim are performed in the DSP; therefore the DSP is considered the means for performing each of the respective functions]
 - edge detection means for detecting an edge (of the local area information) on the basis of, (of the pixels included in the local area information,) pixels having a first color component [Fig. 4, ref. 100b (edge detection for G, the first color); Col. 8, lines 20-52. Note that the gradient of G indicates the direction and strength of a potential edge point. Note that Lin teaches the limitations regarding "local area information;" see below]
 - first interpolation means for interpolating the first color component associated with the pixel of interest by computing a weighted average using, (of the pixels included in the local area information,) the

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pixels having the first color component on the basis of the direction of the edge detected by the edge detection means

[Fig. 1, ref. 40 (first interpolation means); Fig. 2, ref. 42 (interpolating the first color component); Fig. 4, ref. 100b-170 (weighted average 160 & 170 on the basis of edge direction 100b-115, as indicated by the G gradient); Fig. 5; Col. 9, line 51-Col. 10, line 10 (Eq. 13) and Col. 13, line 65-Col. 14, line 33 (Eq. 17 or 18). Note that pixels with color G are used in the weighted average]

- statistic-information computing means for computing statistic information on the basis of the pixels included in the local area information
[Fig. 1, ref. 40 (statistic-information computing means); Fig. 8, ref. 800 (the sum of absolute values is a piece of statistic information); Col. 16, lines 56-60]
- second interpolation means for interpolating a color component other than the first color component associated with the pixel of interest on the basis of the first color component associated with the pixel of interest, which is interpolated by the first interpolation means, and the statistic information
[Fig. 1, ref. 40 (second interpolation means); Fig. 2 (interpolating R and B using interpolated G, the first color component); Fig. 8 and Col. 16, lines 53-56 (also using statistic information as part of the second interpolation)]

Kakarala does not expressly disclose the following, which is taught by Lin

- generation means for making uniform the sensitivity characteristics relative to the optical intensity of pixels (*included in the predetermined area extracted by the extraction means*) and generating local area information including the pixels, each pixel having one of the plurality of color components and the uniform sensitivity characteristic relative to the optical intensity
[Lin: Fig. 2, ref. 2 (generation means); Fig. 2, refs. 4 & 6-R, G, B (each pixel having one of R, G or B color); Figs. 3 & 4 (making uniform sensitivity characteristic); Col. 4, lines 28-50; Col. 4, line 65-Col. 5, line 32 (see Col. 5, line 33-Col. 7, line 46. Note that with the correction using the correction factors the pixels will have uniform sensitivity characteristics. In addition, the pixels along with the corrected colors are (part of) local area information. (Note further that the extraction of local area is disclosed by Kakarala as discussed above)]

Kakarala and Lin are combinable because they both have aspects that are from the same field of endeavor of color processing.

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At the time of the invention it would have been obvious for one of ordinary skill in the art to modify Kakarala with the teaching of Lin as recited above. The motivation would have been to compensate for the difference in the signals output from the imaging elements so that an accurate representation of the image can be obtained, as Lin indicates in Col. 4, lines 56-64.

Therefore it would have been obvious to combine Lin with Kakarala to obtain the invention as specified in claim 1.

11. Regarding claim 2, note that the correction of Lin [Fig. 3] applies to all pixels, including the defective ones.
12. Claim 11 is similarly analyzed and rejected as per the analysis of claim 1 since the combined invention of Kakarala and Lin teaches an apparatus that effects the method recited in claim 11.
13. Claim 12 is rejected since Kakarala further discloses a computer-readable medium [Fig. 1, ref. 50] and implementing the method in software [Col. 4, lines 53-56].

14. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakarala et al. (US 7,088,392) and Lin et al. (US 6,069,973) as applied to claims 1, 2, 11, 12 and 14 above, and further in view of Tsuruoka (US 6,721,003).

Regarding claim 3, the combined invention of Kakarala and Lin discloses all limitations of its parent, claim 1.

In addition, Tsuruoka discloses computing at least one of the average of each color component, standard deviation of each color component, and a correlation coefficient between the first color component and the other color component on the basis of the pixels included in the local area information [Fig. 1, ref. 113; Fig. 7, refs. S7 & S8; Col. 9, lines 61-Col. 10, line 5; Col. 10, lines 30-36]

The combined invention of Kakarala and Lin is combinable with Tsuruoka because they both have aspects that are from the same field of endeavor of color processing.

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify the combined invention of Kakarala and Lin with the teaching of Tsuruoka and choose green as the first color component. The motivation would have been to provide information to reconstruct missing colors, as Tsuruoka indicates in Col. 10, lines 37-38.

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Therefore it would have been obvious to combine Tsuruoka with Kakarala and Lin to obtain the invention as specified in claim 3.

Regarding claim 5, Tsuruoka further discloses

- wherein the second interpolation means interpolates the color component other than the first color component associated with the pixel of interest on the basis of the first color component associated with the pixel of interest, which is interpolated by the first interpolation means, and the average of the color component other than the first color component, which is computed by the statistic-information computing means
[Fig. 7, refs. S7-S9; Col. 9, lines 61-Col. 10 and Col. 37-38. Note that Kakarala discloses using interpolated first color (green) in the interpolation of the other color components, per the analysis of claim 1]

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kakarala et al. (US 7,088,392) and Lin et al. (US 6,069,973) as applied to claims 1, 2, 11, 12 and 14 above, and further in view of Skow (US 7,102,669) and Hirano et al. (US 6,144,412).

Regarding claim 8, the combined invention of Kakarala and Lin discloses all limitations of its parent, claim 1.

In addition, Skow discloses applying gamma conversion before interpolation [Fig. 1, refs. 115 & 120; Col. 7, lines 10-17] and Hirano discloses applying inverse gamma conversion after interpolation [Fig. 7, ref. 77 and Col. 15, lines 25-33]

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The combined invention of Kakarala and Lin is combinable with Skow and Hirano because they all have aspects that are from the same field of endeavor of color processing.

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify the combined invention of Kakarala and Lin with the teaching of Skow and Hirano as recited above. The motivation would have been to increase a perceived dynamic range, as indicated by Skow in Col. 7, lines 10-11, as well as to make the color signals suitable for a display with a linear characteristic, as Hirano indicates in Col. 15, lines 25-27.

Therefore it would have been obvious to combine Skow and Hirano with Kakarala and Lin to obtain the invention as specified in claim 8.

16. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakarala et al. (US 7,088,392) and Lin et al. (US 6,069,973) as applied to claims 1, 2, 11, 12 and 14 above, and further in view of Neter (US 7,133,073).

Regarding claim 9, the combined invention of Kakarala and Lin discloses all limitations of its parent, claim 1.

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The combined invention of Kakarala and Lin does not expressly disclose the following, which is taught by Neter

- wherein the first color component is a color component that statistically has the highest signal level of the plurality of color components
[Fig. 3; Col. 8, lines 32-35]

The combined invention of Kakarala and Lin is combinable with Neter because they both have aspects that are from the same field of endeavor of color processing.

At the time of the invention it would have been obvious for one of ordinary skill in the art to modify the combined invention of Kakarala and Lin with the teaching of Neter and choose green as the first color component. The motivation would have been because human eyes perceive intensity edge better than color edges, as Lin indicates in Col. 8, lines 32-33 and Kakarala uses green gradients (edges) to interpolate green component first, per the analysis of claim 1 above.

Therefore it would have been obvious to combine Neter with Kakarala and Lin to obtain the invention as specified in claim 9.

17. Regarding claim 10, Neter further discloses

- wherein the first color component is a color component that occupies the largest portion of the color mosaic image of the plurality of color components
[Fig. 3; Col. 8, lines 21-26. Note that green is the first color component]

Allowable Subject Matter

11. Claims 4, 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

A. Regarding claim 4, and similarly claims 6 and 7, prior art of record, alone or in combination, does not disclose, teach or suggest interpolating a color using its average, standard deviation, correlation with another color and the interpolated value of that other color.

Contact Information

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

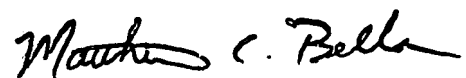
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Yubin Hung
Patent Examiner
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September 12, 2007



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